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# HQUAKES – SAFETY and SURVIVAL

*Earthquakes*



Prepared by the Department of Building and Safety, City of Los Angeles and based on information developed jointly by the U.S. Dept. of the Interior/Geological Survey and the Federal Disaster Assistance Administration (Formerly Office of Emergency Preparedness). Photographs were taken following the San Fernando earthquake of February 9, 1971.

The Los Angeles basin and the surrounding area is underlain by major and minor faults, any one of which is a potential source of an earthquake. The scientific community is unanimous in the prediction that earthquakes will continue to occur in our area.

However, accurate predictions of the time and location of an impending earthquake cannot presently be made and may not be available for many years.



**Veteran's Hospital Collapse**

Earthquake losses can most effectively be reduced through the implementation of strong and properly enforced building codes, zoning ordinances and community preparedness programs. Equally important, an individual can lessen the dangers to himself and family by learning what to do in the event of an earthquake. This brochure is intended to assist the citizens of our community to prepare for future earthquakes and thereby lessen the dangers.



**Apartment House Damage**





# THE DANGERS

The actual movement of the ground in an earthquake is seldom the direct cause of death or injury. Most casualties result from falling objects and debris because the quakes can shake, damage, or demolish buildings and other structures. Earthquakes may also trigger landslides and generate large ocean waves (seismic sea waves) in some areas, each of which can cause great damage.

Injuries are commonly caused by:

1. Total building collapse.
2. Partial building collapses, such as toppling of chimneys, falling brick from wall facings and roof parapets, collapsing walls, falling ceiling plaster, light fixtures, and pictures.
3. Flying glass from broken windows. (This



**Unreinforced Brick Wall Collapse**

danger may be greater from windows in high-rise structures.)

4. Overturned bookcases, fixtures, and other furniture and appliances.
5. Fires from broken chimneys, broken gas lines, and similar causes. The danger may be aggravated by the lack of water due to broken mains.
6. Fallen power lines.
7. Drastic personal actions resulting from the panic of a few individuals.

## WHAT CAN YOU DO?

There are many actions which you can take to reduce the dangers from earthquakes to yourself, your family, and others.

### A. BEFORE AN EARTHQUAKE OCCURS

#### 1. As a citizen:



a. Support local programs for correcting hazardous unreinforced masonry buildings. Unreinforced masonry buildings, built before 1934, are particularly susceptible to earthquake damage and historically have accounted for the major portion of casualties.

The determination of the seismic resistance of a building requires inspection and an analysis of the structure by a person knowledgeable in building construction. However, construction having all or most of the following are very likely to be susceptible to serious earthquake damage:

1. Walls in which lime-mortar was used to joint the individual brick or block. This type of mortar is relatively soft and can be removed or deformed easily with a blunt instrument or even a fingernail.



2. Walls which are approximately one foot or more in thickness, suggesting lack of reinforcement.

3. Brick masonry walls constructed with "header" courses. Header courses consist of brick that are laid in a direction such that the ends of the brick appear in the face of the wall. Typically, header courses were constructed at approximately every fifth brick layer in the wall.

4. Main building construction was performed prior to 1934.



**Dwelling Damage — Chimney Collapse**

b. Support school building programs which provide for the strengthening of old, weak school buildings or their replacement with earthquake-resistive structures on ground reasonably safe from failure during a strong earthquake. Most public schools have now been strengthened (Field Act); some private schools remain uncorrected.

c. Support community efforts to replace old weak buildings and to insure that loose objects on building exteriors (e.g. cornices) are either removed or securely fastened. Within the City of Los Angeles, most parapets have been either securely fastened or removed.

d. Organize and support programs to prepare for future earthquakes. (Schools and civic organizations could provide a very beneficial community service by holding earthquake drills and training sessions to prepare citizens to react properly when earthquakes occur.)

e. Support research programs to identify hazardous areas (active faults, potential landslides, etc.) and to supply information needed to plan wisely the siting, design, and construction of man-made structures.

## **2. As a homeowner or tenant:**

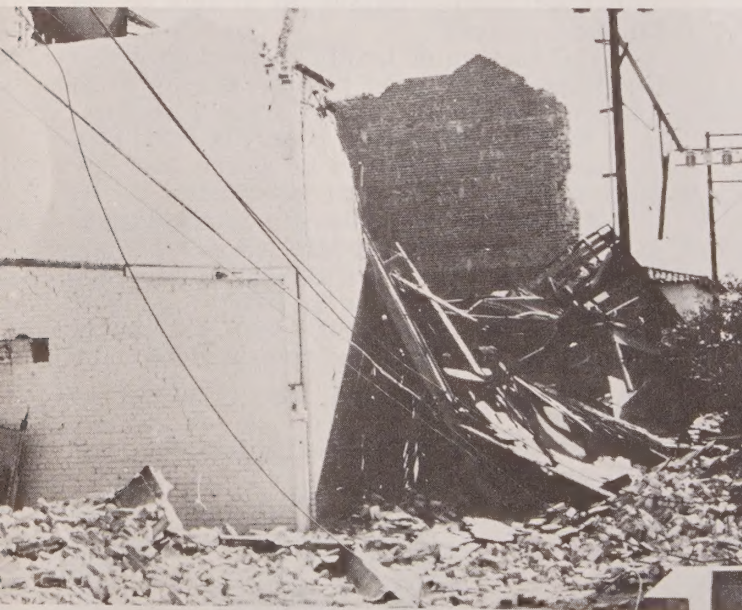
a. Check your home for earthquake hazards. Bolt down or provide other strong support for water heaters and other gas appliances to prevent lurching or toppling since fire damage can result from broken gas lines and appliance connections. Use flexible gas connections wherever possible. Place large and heavy objects on the lower shelves. Securely fasten shelves to walls. Brace or anchor high or top-heavy objects.

b. In new construction and alterations, follow building codes to minimize earthquake hazards. Sites for construction should be selected and engineered to reduce the hazard of damage from an earthquake. Ask your realtor about any hazards near your future home.

c. Move beds away from glass, bookshelves and other heavy overhanging objects.

d. Remove heavy objects from shelves.

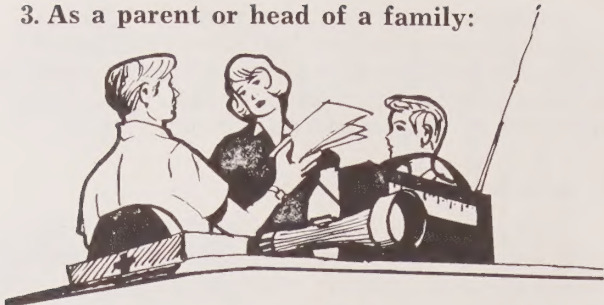
e. Store caustic, flammable or poisonous materials in unbreakable containers and in protected areas. Hook latches on cupboard doors will keep them closed when bumped from within.



**Assembly Building — Unreinforced Brick**



### 3. As a parent or head of a family:



a. Hold occasional home earthquake drills to provide your family with the knowledge to avoid injury and panic during an earthquake.

b. Teach responsible members of your family how to turn off electricity, gas, and water at main switch and valves. Keep the necessary tools for such turnoffs in a readily available location, such as the main gas valve. Do not turn off gas unless you actually smell a gas leak. Check with your local utilities office for instructions, or to have gas turned on.

c. Provide for responsible members of your family to receive basic first aid instruction because medical facilities may be overloaded immediately after a severe earthquake. Call your local Red Cross or civil defense director for information about classes.

d. Keep a flashlight and a battery-powered transistor radio in the home, ready for use at all times.

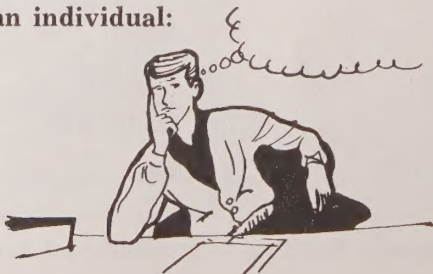
e. Keep immunizations up to date for all family members.

f. Conduct calm family discussions about earthquakes and other possible disasters. Do not tell frightening stories about disasters.

g. Keep an emergency supply of fresh food and water. Water should be stored in a low place and in unbreakable containers.

h. Determine if you are in a possible inundation area in case of a dam failure. If so, be especially alert for news of damage following a quake, and discuss with family members what they should do and where you would meet if the neighborhood is evacuated.

### 4. As an individual:





Think about what you should do if an earthquake strikes when you are at home; driving your car; at work; in a store, a public hall, a theatre or a stadium; visiting friends; or involved in any of your other regular activities. Your planning may enable you to act calmly and constructively in an emergency.

## **B. DURING AN EARTHQUAKE**



1. Remain calm. Think through the consequences of any action, you take. Try to calm and reassure others.

2. If indoors, watch for falling plaster, bricks, light fixtures, and other objects. Watch out for high bookcases, china cabinets, shelves, and other furniture which might slide or topple. Stay away from windows, mirrors, and chimneys. If in danger, get under a table, desk, or bed; in a corner away from windows; or in a strong doorway. Encourage others to follow your example. Usually it is best not to run outside.

3. If in a high-rise office building, get under a desk. Do not dash for exits, since stairways may be broken and jammed with people. Elevators may stop operating in an earthquake.

4. If in a crowded store, or place of public assembly, do not rush for a doorway since hundreds may have the same idea. If you must leave the building, choose your exit as carefully as possible.

5. If outside, keep away from building walls, block or brick fences, power poles, and other objects which could fall. Do not run through streets. If possible, move to an open area away from all hazards. If in an automobile, stop in the safest place available, preferably an open area away from overpasses.

## **C. AFTER AN EARTHQUAKE**



1. Check for injuries in your family and neighborhood. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury.

2. Check for fires or fire hazards.

3. Wear shoes in all areas near debris or broken glass.

4. Check utility lines and appliances for damage. If gas leaks exist, shut off the main gas valve. Do not attempt to turn on the main gas valve. Only the Gas Company or a qualified plumber or mechanic may do this. Shut off electrical power if there is damage to your house wiring. Report damage to your house wiring. Report damage to the appropriate utility companies and follow their instructions. Do not use matches, lighters, or open flame appliances until you are sure no gas leaks exist. Do not operate electrical switches or appliances if gas leaks are suspected. This creates sparks which can ignite gas from broken lines.

5. Do not touch downed power lines or objects touched by the downed wires.

6. Immediately clean up spilled medicines, drugs, and other potentially harmful materials.

7. If water is off, and you do not have an emergency supply, emergency water may be obtained from water heaters, toilet tanks, melted ice cubes, and canned vegetables.

8. Check to see that sewage lines are intact before permitting continued flushing of toilets.



**Don't Stand Under This One!**



9. Do not eat or drink anything from open containers near shattered glass. Liquids may be strained through a clean handkerchief or cloth if danger of glass contamination exists.
10. If power is off, check your freezer and plan meals to use up foods which will spoil quickly.
11. Use outdoor charcoal broilers or camping stoves for emergency cooking.
12. Do not use your telephone except for genuine emergency calls. Turn on your radio for damage reports, information, and for emergency services available.
13. Check your chimney over its entire length for cracks and damage, particularly in the attic and at the roof line. Unnoticed damage could lead to a fire. The initial check should be made from a distance. Approach chimneys with caution.
14. Check closets and storage shelf areas. Open closet and cupboard doors carefully and watch for objects falling from shelves.
15. Do not spread rumors. They often do great harm following disasters.
16. Do not go sightseeing immediately, particularly in beach and waterfront areas where seismic sea waves could strike. Keep the street clear for passage of emergency vehicles.
17. Be prepared for additional earthquake shocks called "aftershocks." Although most of these are smaller than the first shock, it should be anticipated that a second earthquake of equal magnitude could occur shortly afterward. Move vulnerable objects to safer positions. Review other preparation steps.
18. Respond to requests for help from police, fire fighting, civil defense, and relief organizations, but do not go into damaged areas unless your help has been requested. Cooperate fully with public-safety officials. In some areas, you may be arrested for getting in the way of disaster operations.
19. Conserve water for drinking purposes.

There are no rules which can eliminate all earthquake danger. However, damage and injury can be greatly reduced by following the simple rules contained in this leaflet.

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